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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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In the Matter of	)	
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RADIAN CORPORATION	)	
	)	RM-8092
Request for the Allocation	)	
of Two MHz in the	)	
914-916 MHz Band for	)	
the Co-Secondary Use	)	
of Wind Profiler Radar Systems	)	

COMMENTS OF AMTECH CORPORATION

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November 2, 1992

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SUMMARY

AMTECH Corporation ("AMTECH") does not oppose the Petition for Rulemaking ("Petition") filed by Radian Corporation ("Radian"). A non-governmental wind profiling service located in the 914-916 MHz band that is co-secondary with amateur radio operations may indeed be compatible with the uses already authorized in the 902-928 MHz band -- including automatic vehicle monitoring ("AVM") and the possible expansion thereof into the 912-918 MHz band. Unfortunately, the information provided with the Petition does not permit a sufficiently meaningful analysis of the inteferential potential of and commercial need for the Wind Profiler Radar Systems as specifically proposed by Radian.

Accordingly, AMTECH respectfully submits that the Commission should require Radian to supplement the Petition with a fuller technical description of the contemplated operations. Radian should also be asked to explain more clearly why commercial wind profiling at 915 MHz is in the public interest, particularly in light of recent governmental actions to implement wind profiling operations. Radian's Petition, as supplemented, should be put on public notice for further comment.

Finally, Commission action in this matter should take into account current developments in RM 8013, in which the agency is entertaining a petition for the development of permanent AVM rules. Consideration of the Radian Petition should not delay the formulation of a final band plan in that proceeding for primary AVM systems in the 902-928 MHz band.

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COMMENTS OF AMTECH CORPORATION

AMTECH Corporation ("AMTECH"), by its attorneys, hereby comments on the above-referenced Petition for Rulemaking ("Petition") filed by Radian Corporation ("Radian").[1] AMTECH does not oppose the Petition. However, Radian fails to provide a sufficient technical description of its proposed co-secondary operation of Wind Profiler Radar Systems ("WPRS") at 915 MHz to permit meaningful analysis of its proposed use. From the limited information Radian has provided, it appears that wind profiling systems could be a potential source of interference to existing users throughout much of the 902-928 MHz band, including providers of automatic vehicle monitoring ("AVM"). Moreover, Radian has not justified the need for such a service on a non-governmental basis in the requested part of the spectrum.

Accordingly, AMTECH respectfully submits that the Commission should require Radian to supplement its Petition with a fuller technical description of its

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[1] Public notice of the petition was given on October 1, 1992. Report No. 1909.

contemplated operations. Before any allocation is proposed, the public interest requires a better assessment of the interference potential of wind profiling at 915 MHz to the many other existing users of the 902-928 MHz band. Further, Radian should be required to substantiate further the need for commercial WPRS in this band. Once Radian supplements its Petition, the public should have the opportunity to comment thereon before the Commission determines whether or not to issue a Notice of Proposed Rulemaking.

AMTECH urges the FCC to act expeditiously in this matter because the disposition of the Petition may affect the resolution of the ongoing dispute over the proper use of the 902-928 MHz band for AVM systems.[2] Because of the important benefits provided by AVM operations and the need to restore certainty to the AVM industry, consideration of the Radian Petition should not serve to delay the adoption of permanent rules for AVM service at 902-928 MHz.

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[2] On May 28, 1992, PacTel Teletrac (North American Teletrac and Location Technologies, Inc.) filed a Petition for Rulemaking requesting that the FCC revise Section 90.239 for the Commission's Rules, an interim provision that governs AVM operations. RM No. 8013. AMTECH was one of several opponents of PacTel's petition who nonetheless urged the FCC to adopt permanent rules and explore making the entire 902-928 MHz band available for non-governmental AVM systems. See Opposition to Petition for Rulemaking filed by AMTECH Corporation, RM-8013 (July 23, 1992) at 46 ("AMTECH Opposition"); see also, e.g., Opposition of Pinpoint Communications, Inc., RM-8013 (July 23, 1992) at 26. Indeed, as Radian observes, the Commission has sought permission from the Interdepartmental Radio Advisory Committee to opening up the entire band to AVM. Petition at 7 n.22.

I. STATEMENT OF INTEREST

AMTECH is the worldwide leader in the manufacture of AVM devices for transportation applications. Headquartered in Dallas, AMTECH also has research and development, engineering, and manufacturing facilities in Albuquerque and Santa Fe, New Mexico. AMTECH's products are designed and manufactured in the United States, but AMTECH's market is global.

AMTECH has developed a robust AVM technology designed to operate in the shared spectrum environment of 902-928 MHz. AMTECH-equipped systems perform automatic toll collection functions and form a critical component of intelligent vehicle-highway system (IVHS) programs. AMTECH's technology also is used to track rail cars, trucks and intermodal freight.

The AVM technology pioneered by AMTECH furthers important federal transportation policies.[3] It also provides the basis for broad industrial use and is consistent with standards adopted by organizations such as the Association of American Railroads, the American Trucking Associations, the American National Standards Institute, and the International Standards Organization. By the end of 1992, AMTECH estimates that there will be about 700,000 of its tags in use in the United States.

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[3] For example, the Intelligent Vehicle Highway Systems Act of 1991 establishes new U.S. goals to develop highway toll, intermodal and IVHS system operations that are of the type AMTECH is already providing. See Pub. L. No. 102-240, § 6052, 105 Stat. 2189, codified at 23 U.S.C. § 307 note (Supp. III 1991). Furthermore, the State of California has recently adopted an AVM specification that is consistent with AMTECH's technology and proposed use of the 902-928 MHz band.

Although current AVM operations use the 904-912 and 918-926 MHz AVM sub-bands, the Petition suggests that unacceptable interference potentially may be received at those frequencies from high-power WPRS centered at 915 MHz. Moreover, as the Petition acknowledges,[4] the Commission is considering proposals to authorize AVM operation throughout the 902-928 MHz bands, to accommodate the increasing demand and divergent approaches for AVM services. Creation of a WPRS service at 915 MHz could compromise this effort and the transportation and other public interest goals that AVM furthers. Accordingly, AMTECH has a vital interest in the disposition of the Radian Petition.

II. THE RADIAN PETITION FAILS TO PROVIDE SUFFICIENT INFORMATION TO ASSESS THE COMPATIBILITY OF THE PROPOSED OPERATIONS WITH EXISTING USERS OF THE 902-928 MHz BAND.

Radian seeks an allocation of 914-916 MHz for the deployment of WPRS on a co-secondary basis with amateur radio operations.[5] The 902-928 MHz band, however, is currently allocated to several services -- three of them primary to amateur radio -- and an assessment of the compatibility of WPRS with these existing services is central to review of the Petition. In order of priority, the band is allocated to industrial

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[4] Petition at 7 n.22.

[5] See id. at 8.

scientific and medical devices, government radiolocation, AVM,[6] and amateur radio.[7] The band is also increasingly populated by Part 15 unlicensed devices. Although AVM systems are currently authorized to use only 903-912 and 918-927 MHz,[8] waivers have been granted to others to operate in the 912-918 MHz sub-band.[9] Moreover, several parties filing comments in RM-8013 have suggested that the Commission open up the entire 902-928 MHz band for AVM, and the Commission is exploring that approach, as explained above.[10]

Unfortunately, the Petition fails to provide sufficient technical details to permit an analysis as to how compatible WPRS would be with those services already allocated to use the 902-928 MHz band. There is no clear indication in the Petition, for example, of the proposed WPRS' power levels, associated harmonic and spurious emission levels, repetition rates, pulse widths, or "rise" and "fall" times. Although some information about various wind profiling operations has been provided in the Petition's Appendices, it does not appear that this information necessarily relates to the permanent WPRS service proposed by Radian. Virtually all of the profiler systems

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[6] US footnote 275 to the Table of Frequency Allocations provides that amateur radio uses are secondary to AVM throughout the 902-928 MHz band. 47 C.F.R. § 2.106 US 275 (1991).

[7] See 47 C.F.R. § 2.106.

[8] The sub-bands 903-904 and 926-927 MHz are available only for developmental AVM authorizations.

[9] See, e.g., Comments of Allen-Bradley Company, RM-8013 (July 23, 1992).

[10] See note 2, infra.

described are federal government operations or experimental systems, which may or may not be characteristic of the permanent WPRS contemplated by Radian.

Parties interested in commenting on a request for a new service should not be required to piece together the details of the service being proposed, particularly where, as here, the band is already shared by four services, not to mention Part 15 devices. Thus, before the Commission considers the issuance of a Notice of Proposed Rulemaking, it should require Radian to provide additional information that unequivocally describes the technical characteristics of the proposed permanent WPRS service.[11] Once Radian does so, the public should have the opportunity to supplement the record, and comment on the technical specifics of Radian's proposal.

III. THE INFORMATION APPENDED TO THE PETITION RAISES QUESTIONS ABOUT THE INTERFERENCE POTENTIAL OF WPRS AND THE NEED FOR THE NEW SERVICE.

Despite the absence in the Petition of specific technical information about the proposed permanent 915 MHz wind profiling operations, sufficient data were provided so as to raise concerns of potential inference to existing users of the band if WPRS is authorized as requested. Moreover, in view of these prospects for interference, Radian has not yet sufficiently justified the need for an allocation for non-government WPRS in a band used increasingly by other services.

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[11] This additional information is necessary not only to understand better how WPRS systems might interfere with other users of the band but whether wind profilers are robust enough to share the band with the primary and co-secondary services.

A. WPRS May Pose an Interference Threat to Other Users of the 902-928 MHz Band.

Radian claims in its Petition that it will cause "little or no harmful interference to existing primary and other secondary users of the 914-916 MHz band."[12] This suggests that WPRS operations do have the potential to interfere with other co-frequency users. Indeed, the Petition contains evidence that interference problems from these high-powered systems could occur throughout the 902-928 MHz band, in which WPRS would be secondary to ISM devices, government radiolocation, and AVM.

For example, there are prospects for considerable spillover energy outside the 2 MHz allocation Radian seeks. Indeed, this spillover could fall into the current AVM allocations, 902-912 MHz and 918-926 MHz. For example, the materials included by the National Oceanic and Atmospheric Administration ("NOAA") in its Request for Systems Review for Stage 3 Assignment indicate that the -20 dB emission bandwidth for the federal government's 915 MHz wind profilers, operating at 500 watts peak envelope power, is 40 MHz.[13]

As noted above, Radian, in its Petition, does not detail the characteristics of its proposed permanent systems. Radian's experimental license applications, however,

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[12] Petition at 1 (emphasis added).

[13] See Request for IRAC/Spectrum Planning Subcommittee Review for Stage 3 Frequency Assignment for Telecommunication Systems Intended to Provide Radiolocation Service for Wind and Temperature Profiling in the 890-942 MHz Band for the Federal Government, dated October 22, 1991, at 10-13 (attached to Petition as Appendix I).

reveal the potential for significant spillover energy. Estimates of the -20 db bandwidth, when provided in those applications, range as high as 11.2 MHz -- 909.4 to 920.6 MHz.[14] Moreover, Radian's experimental operations typically have been authorized to use 1 kW output power. The cause of this slow energy fall-off may be the extremely high pulse repetition rates, which can be as high as 100,000 per second.[15] Whatever the cause, however, spillover energy of this sort from such high-powered operations could pose the prospect of harmful interference to other users of the 902-928 MHz band.

Although, the Petition asserts that the RF energy is directed within a narrow cone toward the zenith (15-20° from the zenith), and that side lobe emissions are thus at low levels,[16] the materials provided with the Petition suggest the prospects for undesirable levels of side lobe signal energy. In particular, Daniel Law of the NOAA's Forecast Systems Laboratory reports that NTIA has concluded that a separation of 50 km is recommended between wind profilers and amateur repeater

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[14] See Application of Radian Corporation for New Radio Station in the Experimental Radio Service, File No. 1906-EX-PL-91, Exhibit 2, March 27, 1991 (Houston [Harris] TX) ("Harris Application"). Typically, the applications provide only the -3dB and -10dB point bandwidths. These latter bandwidths are generally 3.8 MHz, leaving open the possibility that the -20 dB point bandwidth exceeds 6 MHz and falls into the currently used AVM bands. See, e.g. Application of Radian Corporation for New Radio Station in the Experimental Radio Service, File No. 1972-EX-PL-91, Exhibit 2, June 18, 1991 (Washington, WI).

[15] Harris Application, Exhibit 1.

[16] Petition at 3,8.

stations at 449 MHz.[17] Indeed, precisely because horizontal radiation from wind profilers may be a problem, the Petition notes that there is some flexibility for reorienting the profiler antenna, and thus directing side lobes away from stations experiencing the interference. Moreover, Radian also explains the need for high perimeter fences to reduce the impact from side lobe emissions.[18]

Although antenna reorientation and perimeter fencing may provide some protection for other users of the 902-928 MHz band, the efficacy of that relief depends upon several conditions. First, as the Petition acknowledges, WPRS operations should be located in "isolated, unpopulated areas."[19] However, it appears from the Petition that Radian would also like to sell its product for use in areas more densely populated with radio users, such as in the vicinity of airports.[20] Such operation could pose a threat to an increasing number of AMTECH AVM systems located at airports, including systems in Los Angeles and New York. The ability to reorient the wind profiler antenna array so as to eliminate interference from horizontal radiation remains feasible only if the number of affected stations is relatively small. As more and more

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[17] Daniel C. Law, "Wind Profilers: Applications and Characteristics," QST, June 1992 at 50 ("Wind Profilers") (attached to the Petition as Appendix J). Amateur repeaters are located at 448-450 MHz throughout much of the United States. Roland Barth, "Wind Profiler Frequencies," QST, April 1992, at 24 ("Frequencies") (attached to Petition as Appendix C).

[18] Petition at 8; see also Wind Profilers at 50.

[19] Petition at 8.

[20] See id. at 4.

stations are present, reorientation of the antenna array so as to avoid directing one of the side lobes toward any of the users becomes increasingly difficult.[21] Even in more rural areas, wind profiler operations could interfere with other uses of the band.

Second, the Petition suggests that Radian may want WPRS to be licensed as a portable service.[22] If WPRS stations were to operate on a portable basis, it is quite possible that the use of perimeter fencing could oftentimes be inadequate. The Petition does not adequately explain how protective fencing would be installed in a portable service. Further, although fixed operations could accommodate some degree of frequency management, little meaningful advance planning could be done if the profilers are free to operate at unspecified locations over considerable areas.

Not only do the general technical and operational characteristics of wind profilers raise concerns about their compatibility with other services in the same or adjacent bands, but the Petition recognizes that wind profilers have not always been welcome as neighbors in other bands. For example, the Petition notes that the 216-225 MHz band, which the government considered as one possible home for its wind profilers, was unacceptable, in part, because of the potential interference to amateur

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[21] The materials provided in the Petition not only suggest that the wind profilers have the potential for causing harmful interference, but that they may be rather susceptible to interference themselves. While it may prove to be feasible for wind profilers to co-exist with other users of the band, the Petition fails to offer enough detail for an analysis to be performed of the level of compatibility.

[22] See Petition at 3.

radio, private land mobile, and inland maritime mobile operations.[23] In the 420-450 MHz band, wind profilers apparently pose substantial problems for military radio operations and amateur radio repeaters.[24]

In sum, there are indications in the Petition that wind profilers might not be compatible with existing uses of the 902-928 MHz band. Therefore, before considering the Petition further, the Commission should require Radian to provide a more detailed technical demonstration as to how it would operate WPRS at 915 MHz and how it would protect other primary and co-secondary users of the 902-928 MHz band. The public should have the opportunity to comment on any supplements that Radian makes to its Petition.

B. The Petition Does Not Substantiate a Need for Non-Government Wind Profilers At 915 MHz

Not only might an allocation for WPRS at 915 MHz create interference problems throughout the 902-928 MHz band, but the Petition does not contain sufficient justification for a commercial WPRS at 915 MHz, particularly in light of that potential for interference. As indicated in the Petition, although the useful frequency range for profilers is 50-1200 MHz, NOAA has "determined that frequencies between

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[23] Id. at 6.

[24] Id. at 7.

200 and 500 MHz provide the best performance."[25] Specifically, last December, NTIA determined that 449 MHz appears to be the most suitable for wind profiler operations, and it appears as though government operations will be focused there, despite the availability of 914-916 MHz to the federal government.[26]

Nonetheless, Radian suggests that there is a need for commercial wind profiler systems at 915 MHz. Radian, it appears, bases this on the ability of such profilers to make measurements down to 100 meters above ground level ("agl"), whereas profilers at 500 MHz are limited to minimums of 300-400 meters agl.[27] But the discussion of various wind profiling applications provided in the Petition -- meteorological, aviation, and environmental -- does not make clear why the latter limit would not be sufficient for most cases.[28] As an article attached by Radian to its Petition explains, wind profilers operating at 449 MHz

> will allow aircraft to operate more safely while using less fuel. It will help meteorologists to predict more precisely and accurately the development and movement of weather phenomena such as

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[25] Frequencies, QST, April 1992, at 22 (emphasis added). Radian suggests that this conclusion relates only to upper-atmosphere wind profilers (Petition at 6 n.14), but this is not clear from the provided materials. Barth, for example, states quite clearly that, out of the 50-1200 MHz range, 200-500 is optimal.

[26] Memorandum, dated December 11, 1991, from Richard D. Parlow, Associate Administrator, Office of Spectrum Management, NTIA, to Executive Secretary, IRAC, at 3 (attached to Petition as Appendix H).

[27] Neff et al., "The Use of 915 MHz Wind Profilers in Complex Terrain and Regional Air Quality Studies," Seventh Joint Conference on Applications of Air Pollution Meteorology (1991) at J230 (attached to the Petition as Appendix G).

[28] See Petition at 4-5.

> severe thunderstorms. Profilers will enable better prediction of the movement and dispersion of volcanic ash and atmospheric pollutants and mitigate the effect of environmental hazards.[29]

Although there is some suggestion that operation at 915 MHz, in contrast with 449 MHz, will allow measurement of wind shear at low altitudes, so as to benefit aircraft in their landing approaches,[30] it remains unclear why such operations would not be conducted by the FAA pursuant to the government's own radiolocation allocations.

In contrast with the proposed commercial WPRS service, the 902-928 MHz band already supports a delicate public interest balance of several services. AVM service, for example, is already meeting important transportation and industrial needs. Applications of AMTECH equipment in operation include traffic management and highway toll, railroads, trucking, intermodal shipping and air transport. Moreover, the extent of these applications continues to increase rapidly: AMTECH currently is shipping AVM transponders for installation at a rate in excess of 90,000 per month. The band also supports numerous industrial, scientific, and medical RF devices, as well as an increasing number of amateur radio operations. Further, the Commission has recently taken a number of steps to facilitate the use of Part 15 devices at 902-928 MHz.[31]

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[29] Rick Palm, "Wind Profilers at 449 MHz," QST, March 1992, at 20 (attached to Petition as Appendix B).

[30] Id. at 21.

[31] See e.g., 47 C.F.R. § 15.245 (1991) (permitting operation of field disturbance sensors); 47 C.F.R. § 15.247 (permitting operation of spread spectrum systems); 47 (continued...)

In short, there is some doubt whether Radian, in its Petition, has demonstrated an adequate basis for a commercial wind-profiling allocation at 915 MHz. Given the federal government's decision to use 449 MHz for wind profiling, the increasing use of the 902-928 MHz band by AMTECH and others, and the potential interference from wind profiling discussed above, the Commission should require a stronger demonstration of the need for the requested allocation before granting Radian's Petition.

IV. AT A MINIMUM, THE COMMISSION SHOULD CONSIDER AN ALLOCATION FOR COMMERCIAL WPRS AT 915 MHz IN THE CONTEXT OF CURRENT REQUESTS TO OPEN UP THE ENTIRE 902-928 MHz BAND FOR AVM

As discussed above, the Commission has before it requests to adopt permanent AVM rules that permit operations throughout the 902-928 MHz band.[32] The record in RM-8013 makes clear that the growth in the number of AVM systems may require such action to accommodate the diverse systems of AVM service providers. These systems already serve over half-a-million vehicles in AMTECH's case alone, with several million more users projected in the next few years. Accordingly, if the Commission were to consider an allocation for WPRS at 915 MHz, it should do so

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[31](...continued)
C.F.R. § 15.249 (permitting operation of general intentional radiators such as the new generation of cordless telephones now appearing in stores).

[32] See note 2, infra.

only after adopting a final AVM allocation or, at a minimum, in combination with a proposed solution for AVM systems. Should the Commission, as AMTECH suggests, determine that the public interest requires Radian to submit additional information, AMTECH requests that Radian's Petition be handled expeditiously in order not to delay an adoption of permanent AVM rules.

CONCLUSION

For the foregoing reasons, AMTECH respectfully submits that, in its current form, the Radian Petition fails to provide sufficient information to warrant a Commission proposal for a WPRS allocation at this time. There are unanswered questions about the potential for substantial harmful interference to existing primary and co-secondary users of the band. These cannot be resolved adequately without a more complete technical description of what Radian intends to do. Moreover, the Petition fails to demonstrate the need for a non-governmental WPRS at 915 MHz, in addition to current and planned deployment of governmental profilers. Therefore, before the Commission proposes an allocation in the 915 MHz band for WPRS, it should require Radian to supplement its Petition to provide a fuller explanation of the proposed operation and justification for the service. Moreover, the FCC should first account for the requirements of the AVM industry for permanent rules and regulations before issuing a proposed WPRS allocation; at a minimum, the FCC should consider the adoption of WPRS and AVM rules at the same time. In

any event, consideration of the Radian Petition should not lead to a delay in the formulation of permanent AVM rules.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on this 2nd day of November, 1992, I caused copies of the foregoing "Comments of AMTECH Corporation" to be mailed via first-class postage prepaid mail to the following:

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